

**REMARKS**

Claims 1-3 and 5-17 are pending in the application. Claims 3, 7-14 and 17 have been withdrawn from consideration. Claims 1, 15 and 16 have been amended. Claim 4 has been canceled. Favorable reconsideration of the application is respectfully requested.

***I. REJECTION OF CLAIM UNDER 35 U.S.C. § 112***

Claim 16 has been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter Applicant regards as the invention. Specifically, the Examiner states that "the non-doped nitride semiconductor layer" lacks antecedent basis. Claim 15, from which claim 16 depends has been amended, and now provides antecedent basis for the non-doped nitride semiconductor layer.

***II. REJECTION OF CLAIMS UNDER 35 U.S.C. § 102(b)***

Claims 1, 2 and 15 have been rejected under 35 U.S.C. §102(b) as being anticipated by Tsujimura et al. (U.S. Publication No. 2003/0132448).

Tsujimura et al. discloses a semiconductor light-emitting device that includes a cladding layer 13 of n-type AlGaIn for creating a potential barrier for a multiple quantum well active layer; an optical guide layer 14 of n-type AlGaIn; a multiple quantum well active layer 15; an optical guide layer 16 of p-type AlGaIn; and a cladding layer 17 of p-type AlGaIn for creating a potential barrier for the multiple quantum well active layer 15 (see Fig. 1 below). It is the Examiner's position that layer 16 corresponds to the first p-type nitride semiconductor layer and layer 17 corresponds to the second p-type nitride semiconductor layer.

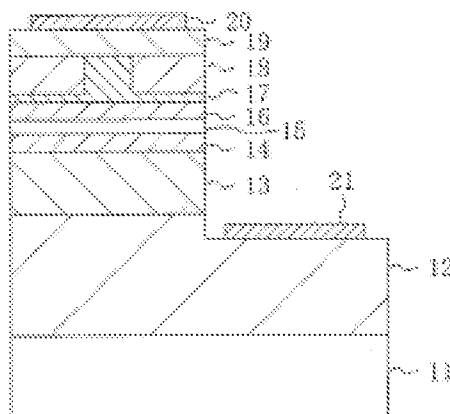


Fig. 1, Tsujimura et al.

Applicants respectfully traverse the rejection for at least the following reasons. Claims 1 and 15 have been amended to incorporate the subject matter of original claim 4. In addition, the following features have been added to claims 1 and 15.

- a. The non-doped nitride semiconductor layer is located between the first p-type nitride semiconductor layer and the active layer, and is contact with the first p-type nitride semiconductor layer.
- b. A non-doped GaN layer is located between the non-doped nitride semiconductor layer and the active layer and is in contact with the non-doped nitride semiconductor layer.
- c. The active layer has a plurality of GaInN layers, and has no intentional doped impurity.

“The non-doped nitride semiconductor layer” as recited in claims 1 and 15 corresponds to “the non-doped  $\text{Al}_{0.03}\text{Ga}_{0.97}\text{N}$  intermediate layer 408” of Fig. 4 of the present application. “The non-doped GaN layer” recited in claims 1 and 15 corresponds to “the non-doped GaN intermediate layer 407” of Fig. 4 of the present application. Support for the amendments to claims 1 and 15 can be found, for example, on page 25, line 16 to page 26, line 19 of the instant specification and in Figs. 4 and 5.

In the presently claimed invention, the non-doped nitride semiconductor layer, the first nitride semiconductor layer and the second p-type nitride semiconductor layer are made of AlGaN. The lattice constant of AlGaN is smaller than that of GaN. The active layer is made of GaInN. The lattice constant of GaInN is larger than that of GaN. The

lattice strain is imposed on the active layer because of the lattice constant difference between the GaInN active layer and the AlGaIn p-type layer. With the presently claimed nitride semiconductor device, the lattice strain is reduced by the non-doped GaN intermediate layer, which is located between the non-doped nitride semiconductor layer and the active layer. Tsujimura et al. fails to teach or suggest such (i) a non-doped nitride semiconductor layer located between the first p-type nitride semiconductor layer and the active layer, and in contact with the first p-type nitride semiconductor layer; and (ii) a non-doped GaN layer located between the non-doped nitride semiconductor layer and the active layer and in contact with the non-doped nitride semiconductor layer.

Furthermore, the active layer of the presently claimed nitride semiconductor device has no dopant. In contrast, Tsujimura et al. discloses that the well and barrier layers 151 and 152 are preferably doped with Si as a dopant ([0077]). Tsujimura et al. fails to teach or suggest the non-doped active layer. Therefore, Tsujimura et al. fails to anticipate or render obvious the claims as amended. Applicants respectfully submit that the rejection under 35 U.S.C. §102(b) should be withdrawn.

## ***II. REJECTION OF CLAIMS 4-6 AND 16 UNDER 35 U.S.C. § 103(a)***

Claims 4-6 and 16 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsujimura et al. and further in view of Okumura (U.S. Patent No. 6,456,640). The Examiner acknowledges that Tsujimura et al. fails to teach a non-doped third layer containing Al between the active layer and the first p-type nitride layer. However, the Examiner contends that it would have been obvious to have modified the first p-type AlGaIn layer 16 of Tsujimura et al. by adding to it an undoped light guiding sublayer based on the teaching of Okumura

Applicants respectfully traverse the rejection for at least the following reasons. As discussed above, Tsujimura et al. fails to teach or suggest the recited features of (i) a non-doped nitride semiconductor layer located between the first p-type nitride semiconductor layer and the active layer and in contact with the first p-type nitride semiconductor layer; (ii) a non-doped GaN layer located between the non-doped nitride

semiconductor layer and the active layer, and in contact with the non-doped nitride semiconductor layer; and (iii) a non-doped active layer. Okumura fails to cure the deficiencies of Tsujimura et al. Thus, even if one skilled in the art were motivated to combine the teachings of Tsujimura et al. with those of Okumura, the resulting combination would not include all of the recited features of the claimed invention. Therefore, prima facie obviousness has not been established and the rejection of claims 5, 6 and 16 under 35 U.S.C. § 103(a) should be withdrawn.

### **III. CONCLUSION**

Accordingly, claims 1, 2, 5, 6, 15 and 16 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should a petition for an extension of time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988.

Respectfully submitted,

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